For the most current version of this MSDS log onto http://www.carlisle-syntec.com and go to Products and Specs/MSDS.

Material Safety Data Sheet

TPO PRIMER **MSDS No. 310471**

Date of Preparation: 03/21/11 Revision: 004

Section 1 - Chemical Product and Company Identification

Product/Chemical Name: TPO Primer
Chemical Formula: Mixture
General Use: Primer
Manufacturer: Carlisle SynTec, 1285 Ritner Highway, Carlisle, PA 17013, Phone: 800-479-6832
Emergency Phone Number: CHEMTREC (USA) 800-424-9300

Section 2 - Hazards Identification

☆☆☆☆☆ Emergency Overview ☆☆☆☆☆

Danger – Highly Flammable Liquid and Vapor
Warning – Causes skin irritation
Warning – Causes serious eye irritation
Warning – May be harmful if swallowed and enters airways
Warning – Suspected of damaging fertility or the unborn child
Warning – May cause an allergic skin reaction
Warning – Suspected of causing genetic defects
Warning – May cause damage to organs (liver, kidney, ear) through prolonged or repeated exposure
Warning – May cause drowsiness and dizziness

Potential Health Effects

HMIS	
H	1
F	3
R	0
PPE†	
†Sec. 8	

Primary Entry Routes: Skin contact, skin absorption, eye contact, inhalation, ingestion.
Target Organs:
Acute Effects
Inhalation: Throat irritation on short-term exposure to liquid or vapor. Aspiration into lungs can cause chemical pneumonitis which can be fatal.
Eye: Can cause severe irritation, redness, tearing, blurred vision.
Skin: Can cause redness, irritation, dermatitis.
Ingestion: Can cause gastrointestinal irritation, nausea, vomiting, and diarrhea.
Carcinogenicity: IARC, NTP, and OSHA do not list this product as a carcinogen.
Medical Conditions Aggravated by Long-Term Exposure: Pre-existing eye, skin, and pulmonary disorders may be aggravated by exposure to this material.
Chronic Effects: Overexposure may result in headache, dizziness, fatigue, nausea, possible unconsciousness, even asphyxiation. Moderate irritation of skin, eyes, and mucous membranes of upper respiratory tract on prolonged/repeated contact. Dermatitis and defatting of the skin. Chronic exposure may cause reversible liver and kidney injury.
Reports have associated repeated and prolonged occupational overexposure to solvents with permanent brain and nervous system damage. Repeated exposure to Toluene has been associated with high frequency hearing loss based on animal tests.

Section 3 – Ingredient Information

Hazardous Ingredients	CAS Number	% wt
Light Aliphatic Solvent Naphtha	64742-89-8	30-60
Toluene	108-88-3	15-40
Additional Ingredients	**CAS Number**	**% wt**

Section 4 - First Aid Measures

Inhalation: Remove victim to fresh air and provide oxygen if breathing is difficult. Give artificial respiration if not breathing. Get medical attention immediately.
Eye Contact: Immediately flush eyes with running water for at least 15 minutes. Get medical attention.
Skin Contact: Immediately flush skin with running water and remove contaminated clothing. Wash exposed area with soap and water. Get medical attention.
Ingestion: Do not induce vomiting. Get medical attention immediately.

Note to Physicians: This product contains toluene and naphtha.
Special Precautions/Procedures: Whenever possible, remove the worker from the source of contamination.

Section 5 - Fire-Fighting Measures

Flash Point: 18°F (-8 °C)
Flash Point Method: Based on Flash Point of the most volatile component.
Autoignition Temperature: 433.4°F (223 °C)
LEL: 1.2% v/v
UEL: N.A.
Flammability Classification:

NFPA

Extinguishing Media: Foam, dry chemical or carbon dioxide. Water may be ineffective but water should be used to keep fire exposed containers cool.
Unusual Fire or Explosion Hazards: Extremely flammable. Store and use away from all sources of heat, flame, or sparks. Do not smoke while applying. Vapors are heavier than air and may travel along ground or may be moved by ventilation and ignited by pilot lights, other flames, sparks, heaters, smoking, electrical motors, static discharge, or other ignition sources at locations distant from material handling point and flash back. All containers should be grounded when material is transferred. Residue in "empty" containers may be explosive if exposed to an ignition source.
Hazardous Combustion Products: Toxic gases or vapors, such as carbon monoxide, carbon dioxide, or oxides of nitrogen may be released in a fire.
Fire-Fighting Instructions: This product contains solvents that are dangerous fire and explosion hazards when exposed to heat or flame. Fire fighters should wear self-contained breathing apparatus and full protective clothing with full-face pieces operated in the positive pressure demand mode.
Fire-Fighting Equipment: Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full face piece operated in pressure-demand or positive-pressure mode.

Section 6 - Accidental Release Measures

Spill /Leak Procedures: Remove all sources of ignition. Avoid breathing vapors. Use self-contained breathing apparatus in enclosed area. Ventilate area. Restrict access by unauthorized personnel. Contain and remove with inert absorbent materials and non-sparking tools.
Large Spills
Containment: For large spills, dike far ahead of liquid spill for later disposal. Do not release into sewers or waterways.
Cleanup: Clean-up spill as soon as possible. Collect any excess material with absorbent pads, sand, or other inert, non-combustible, absorbent materials. Place into appropriate waste containers for later disposal. Waste is considered hazardous due to its ignitability. Comply with all laws and regulations.
Regulatory Requirements: Follow applicable OSHA regulations (29 CFR 1910.120).

Section 7 - Handling and Storage

Handling Precautions: Use away from all sources of heat, flame, or sparks. Do not smoke while using. Handling equipment must be grounded to prevent sparking. Handle with non-sparking tools. Wash with soap and water before eating or drinking. Launder contaminated clothing. Do not reuse containers unless properly reconditioned. KEEP OUT OF REACH OF CHILDREN.
Storage Requirements: Keep containers cool, dry, and store away from all sources of heat, flame, and sparks. Keep containers tightly closed and store with adequate ventilation. Do not pressurize, cut, weld, or grind the containers or empty containers which may contain residual product and solvent vapors that may ignite explosively.

Section 8 - Exposure Controls / Personal Protection

Hazardous Ingredients:

	OSHA PEL		ACGIH TLV		NIOSH REL		NIOSH
Ingredient	TWA	STEL	TWA	STEL	TWA	STEL	IDLH
Light Aliphatic Solvent Naphtha	300 ppm	400 ppm	300 ppm	None estab.	350 ppm	None estab.	None estab.
Toluene	200 ppm	150 ppm	20 ppm	None estab.	100 ppm	150 ppm	500 ppm

Engineering Controls: Do not use in enclosed areas without proper explosion-proof ventilation. General and local exhaust ventilation must be sufficient to control vapor concentrations and keep the PEL below 100 ppm.
Ventilation: Provide general or local exhaust ventilation systems to maintain airborne concentrations below OSHA PELs. Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.
Respiratory Protection: A NIOSH approved respirator must be used if vapor concentration is 100 ppm or above.

Protective Clothing/Equipment: Permeation resistant gloves (that meet ANSI/ISEA 105-2005) recommended. Glasses with side shields or goggles are recommended. Wear industrial shoes to protect feet from adhesive contact. Wear long sleeves, long trousers to protect skin from adhesive contact.
Safety Stations: Make emergency eyewash stations, safety/quick-drench showers, and washing facilities available in work area.
Contaminated Equipment: Separate contaminated work clothes from street clothes. Launder before reuse. Remove this material from your shoes and clean personal protective equipment.
Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance and Odor: Clear liquid with characteristic solvent odor.
Odor Threshold(ppm): Not available.
Vapor Pressure: 38 mm Hg at 68 °F (20 °C)
Vapor Density (Air=1): 3.6
Density: 7.40 lbs./gal. (calculated)
Specific Gravity (H_2O=1, at 4°C/39°F): 0.75 – 0.81
pH: N/A

Water Solubility: Insoluble
Boiling Point (°F): 185 (85°C)
Freezing/Melting Point(°C): N/A
% Volatile: 85
Evaporation Rate (Ethyl Ether = 1) : 3.5
VOC: 645 gms./ l.
Flash Point: 18°F (-8 °C)
Flash Point Method: Based on Flash Point of the most volatile component.
Autoignition Temperature: 433.4°F (223 °C)
LEL: 1.2% v/v
UEL: N.A.

Section 10 - Stability and Reactivity

Stability: Stable.
Possibility of Hazardous Reactions: Will not occur.
Chemical Incompatibilities: Strong oxidizing agents, acids, bases.
Conditions to Avoid: Heat, sparks, and flames; ignition sources.
Hazardous Decomposition Products: Toxic gases or vapors such as carbon monoxide, aldehydes and other decomposition products may be released in a fire.

Section 11- Toxicological Information

Toxicity Data:

Eye Effects: Irritation at or above PEL of 100 ppm.

Skin Effects: Irritation at or above PEL of 100 ppm.

Acute Inhalation Effects: Product toxicity has not been determined.
The following is component data:
Toluene – Rat, Inhalation, LC_{Lo}: 4000ppm/4 hrs

Acute Oral Effects: Product toxicity has not been determined.
The following is component data:
Toluene - Rat, oral, LD_{50}:5000mg/kg

Carcinogenicity: Not listed in IARC or NTP.
Mutagenicity: Some evidence in animal exposure to Toluene.
Teratogenicity: Some evidence in animal exposure to Toluene.

Section 12 - Ecological Information

This product has not been tested. No data available.

Section 13 - Disposal Considerations

Disposal: Dispose of in accordance with all local, state, and federal regulations.

Section 14 - Transport Information

DOT Transportation Data (49 CFR 172.101):

Shipping Name: Adhesives
Shipping Symbols:
Hazard Class: 3
ID No.: UN1133
Packing Group: II
Label: Red caution label required
Special Provisions (172.102):
149, B52, IB2, T4, TP1, TP8

Packaging Authorizations
a) Exceptions: 173.150
b) Non-bulk Packaging: 173.173
c) Bulk Packaging: 173.242

Quantity Limitations
a) Passenger, Aircraft, or Railcar: 5 L
b) Cargo Aircraft Only: 60 L

Vessel Stowage Requirements
a) Vessel Stowage: B
b) Other: N/A

Section 15 - Regulatory Information

EPA Regulations:

TSCA Inventory: All components are included in the EPA Toxic Substance Control Act (TSCA) Chemical Substance Inventory.

RCRA Hazardous Waste Number (40 CFR 261.33): Toluene U220

RCRA Hazardous Waste Classification (40 CFR 261.31): Classified Hazardous Waste

CERCLA Hazardous Substance (40 CFR 302.4) listed/unlisted specific per RCRA, Sec. 3001; CWA, Sec. 311 (b)(4); CWA, Sec. 307(a), CAA, Sec. 112

CERCLA Reportable Quantity (RQ), Toluene 1,000 lb (454.5 kg)

SARA 311/312 Codes: Fire, Acute (Immediate) Health Hazard, Chronic (Delayed) Health Hazard.

SARA Toxic Chemical (40 CFR 372.65): Toluene, CAS# 108-88-3, 20 –15-40%

SARA EHS (Extremely Hazardous Substance) (40 CFR 355): Not listed

OSHA Regulations:

Air Contaminant (29 CFR 1910.1000, Table Z-1, Z-1-A): Not listed

Clean Air Act Data: Toluene HAP Code: XOV

Clean Water Act: Toluene is listed as a priority pollutant. RQ: 1,000 lbs. (454.5 kg)

State Regulations:

California Proposition 65: This product contains the following chemical(s) known to the state of California to cause birth defects or other reproductive harm: Toluene.

Delaware Air Quality Management List: Toluene DRQ: 1,000 State: Y

Massachusetts Hazardous Substance Codes: Toluene 108-88-3 2,4,5,6,F7,F8,F9

Michigan Critical Materials Register: Toluene 108-88-3 Report: -- Class: --

Minnesota Hazardous Substance: Toluene Codes: ANO Hazards: skin Carcinogen: No

New Jersey RTK Hazardous Substance: Toluene Dot#: 1294 Substance#: 1866 TPQ: -- EHS: No

New York List of Hazardous Substances: Toluene RQ Air: 1,000 RQ Land: 1 Acutely Hazardous: No

Pennsylvania Hazardous Substance Code: Methyl Benzene (Toluene) 108-88-3 Code: E

Washington Permissable Exposure Limits for Air Contaminants: Toluene, 108-88-3, TWA 100 ppm, TWA 375 mg
STEL 150 ppm, STEL 560 mg

Canadian WHMIS Classification: Class: B
Division 2

Section 16 - Other Information

Prepared By: Research & Development
Revision Notes: General Revision.

Disclaimer: The information contained in this document is based upon data that was supplied to Carlisle by other companies and organizations. No warranty of merchantability or fitness for a particular purpose is expressed or implied regarding the accuracy or completeness of the data and/or information in this material safety data sheet.

For the most current version of this MSDS log onto http://www.carlisle-syntec.com and go to Products and Specs/MSDS.

Material Safety Data Sheet

SURE-WELD BONDING ADHESIVE **MSDS No. 302099**

Date of Preparation: 12/17/09 Revision: 013

Section 1 - Chemical Product and Company Identification

Product/Chemical Name: SURE-WELD BONDING ADHESIVE
Chemical Formula: Mixture
General Use: Contact Bonding Adhesive
Manufacturer: Carlisle SynTec Incorporated, 1285 Ritner Highway, Carlisle, PA 17013, Phone: 800-479-6832
Emergency Phone Number: CHEMTREC (USA) 800-424-9300

Section 2 - Hazards Identification

☆☆☆☆☆ Emergency Overview ☆☆☆☆☆

Warning – Highly flammable liquid and vapor
Warning – Causes skin irritation
Warning – Causes serious eye irritation
Warning – May be harmful if swallowed and enters airways
Danger – May damage fertility or the unborn child
Warning – May cause an allergic skin reaction
Warning – Suspected of causing genetic defects (skin)
Warning – May cause drowsiness and dizziness
Warning – May cause damage to organs (liver, kidney, ear) through prolonged or repeated exposure

HMIS	
H	1
F	4
R	0
PPE†	

†Sec. 8

Potential Health Effects

Primary Entry Routes: Skin contact, skin absorption, eye contact, inhalation, ingestion.
Acute Effects
Inhalation: Throat irritation on short-term exposure to liquid or vapor. Aspiration into lungs can cause chemical pneumonitis which can be fatal.
Eye: Irritation on short-term exposure to liquid or vapor.
Skin: Irritation on short-term exposure to liquid or vapor.
Ingestion: Ingestion can cause gastrointestinal irritation.
Carcinogenicity: IARC, NTP, and OSHA do not list this product as a carcinogen.
Medical Conditions Aggravated by Long-Term Exposure: Respiratory symptoms associated with pre-existing lung disorders and pre-existing heart disorders may be aggravated by exposure to this material.
Chronic Effects: Overexposure may result in headache, dizziness, fatigue, nausea, possible unconsciousness, even asphyxiation. Moderate irritation of skin, eyes, and mucous membranes of upper respiratory tract on prolonged/repeated contact. Dermatitis and defatting of the skin. Chronic exposure may cause reversible liver and kidney injury.
Reports have associated repeated and prolonged occupational overexposure to solvents with permanent brain and nervous system damage. Repeated exposure to Toluene has been associated with high frequency hearing loss based on animal tests.

Section 3 - Composition / Information on Ingredients

Ingredient Name	CAS Number	% wt *or* % vol
Toluene	108-88-3	30-60
Heptane	142-82-5	10-30
Acetone	67-64-1	7-13
Xylene	1330-20-7	1-5
Magnesium Oxide	1309-48-4	0.1-1.0
Polychloroprene	9010-98-4	
Phenolic Resin	26022-00-4	

Hazardous Ingredients:

Ingredient	OSHA PEL TWA	OSHA PEL STEL	ACGIH TLV TWA	ACGIH TLV STEL	NIOSH REL TWA	NIOSH REL STEL	NIOSH IDLH
Heptane	500 ppm	500 ppm	400 ppm	500 ppm	85 ppm	440 ppm	750 ppm
Acetone	1000 ppm	1000 ppm	500 ppm	750 ppm	250 ppm	none estab.	2500 ppm
Toluene	200 ppm	150 ppm	20 ppm (skin)	None estab.	100 ppm	150 ppm	500 ppm
Xylene	100 ppm	150 ppm	100 ppm	150 ppm	100 ppm	150 ppm	900 ppm
Magnesium Oxide	15mg/m³ (as dust)	None estab.	10mg/m³	None estab.	10 mg/m³	None estab.	750mg/m³

Section 4 - First Aid Measures

Inhalation: Remove victim to fresh air and provide oxygen if breathing is difficult. Give artificial respiration if not breathing. Get medical attention immediately.
Eye Contact: Immediately flush eyes with running water for at least 15 minutes. Get medical attention.
Skin Contact: Immediately flush skin with running water and remove contaminated clothing. Wash exposed area with soap and water. Get medical attention.
Ingestion: Do not induce vomiting. Get medical attention immediately.
Note to Physicians: This product contains toluene and heptane.
Special Precautions/Procedures: Whenever possible, remove the worker from the source of contamination.

Section 5 - Fire-Fighting Measures

Flash Point: -4°F (-20°C)
Flash Point Method: Pensky - Martens CC
Autoignition Temperature: 433.4°F (223 °C)
LEL: 1.0% v/v
UEL: 12.8% v/v
Flammability Classification: Division 2

NFPA

Extinguishing Media: In case of fire, use dry chemical, carbon dioxide, or foam. Water may not be effective as an extinguishing agent. Water fog or spray may be used to provide a smothering effect on fire and to cool fire-exposed container and surrounding combustibles. Do not use a solid stream of water because it can scatter and spread the fire.
Unusual Fire or Explosion Hazards: Extremely flammable. Store and use away from all sources of heat, flame, or sparks. DO not smoke while applying. Vapors are heavier than air and may travel along ground or may be moved by ventilation and ignited by pilot lights, other flames sparks, heaters, smoking, electrical motors, static discharge, or other ignition sources at location distant from material handling point and flash back. All containers should be grounded when material is transferred.
Hazardous Combustion Products: Toxic gases or vapors, such as carbon monoxide, carbon dioxide, or oxides of nitrogen may be released in a fire.
Fire-Fighting Instructions: This product contains solvents that are dangerous fire and explosion hazards when exposed to heat or flame. Fire fighters should wear self-contained breathing apparatus and full protective clothing with full-face pieces operated in the positive pressure demand mode.
Fire-Fighting Equipment: Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full face piece operated in pressure-demand or positive-pressure mode.

Section 6 - Accidental Release Measures

Spill /Leak Procedures: Remove all sources of ignition. Avoid breathing vapors. Use self-contained breathing apparatus in enclosed area. Ventilate area. Contain and remove with inert absorbent materials and non-sparking tools.
Large Spills
Containment: For large spills, dike far ahead of liquid spill for later disposal. Do not release into sewers or waterways.
Cleanup: Clean-up spill as soon as possible. Collect any excess material with absorbent pads, sand, or other inert non-combustible absorbent materials. Place into appropriate waste containers for later disposal. Comply with all laws and regulations.
Regulatory Requirements: Follow applicable OSHA regulations (29 CFR 1910.120).

Section 7 - Handling and Storage

Handling Precautions: Use away from all sources of heat, flame, or sparks. Do not smoke while using. Handling equipment must be grounded to prevent sparking. Handle with non-sparking tools. Wash with soap and water before eating or drinking. Launder contaminated clothing. KEEP OUT OF REACH OF CHILDREN.
Storage Requirements: Keep containers cool, dry, and store away from all sources of heat, flame, and sparks. Keep containers tightly closed and store with adequate ventilation. Do not pressurize, cut, weld, or grind the containers or empty containers which may contain residual product and solvent vapors that may ignite explosively.

Section 8 - Exposure Controls / Personal Protection

Engineering Controls: Do not use in enclosed areas without proper explosion-proof ventilation. General and local exhaust ventilation must be sufficient to control vapor concentrations and keep the PEL below 100 ppm.
Ventilation: Provide general or local exhaust ventilation systems to maintain airborne concentrations below OSHA PELs. Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.
Respiratory Protection: A NIOSH approved respirator must be used if vapor concentration is 100 ppm or above.
Protective Clothing/Equipment: Permeation resistant gloves (that meet ANSI/ISEA 105-2005) recommended. Glasses or goggles recommended. Wear industrial shoes to protect feet from adhesive contact. Wear long sleeves and trousers to protect skin from adhesive contact.

Safety Stations: Make emergency eyewash stations, safety/quick-drench showers, and washing facilities available in work area.
Contaminated Equipment: Separate contaminated work clothes from street clothes. Launder before reuse. Remove this material from your shoes and clean personal protective equipment.
Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance and Odor: Yellowish liquid with strong hydrocarbon odor.
Odor Threshold(ppm): Not available.
Vapor Pressure: 37 mm Hg at 86 °F (30 °C)
Vapor Density (Air=1): 2.0-3.5
Density: 7.09 lbs./gal. (calculated)
Specific Gravity (H_2O=1, at 4°C/39°F): 0.849
pH: N/A

Water Solubility: Negligible.
Boiling Point (°C): 56-110 (133-230°F)
Freezing/Melting Point(°C): -91 (-132°F)
% Volatile: 78-82
Evaporation Rate: 1.9-8.3
VOC: 670 g/l
Flash Point: -4°F (-20°C)
Flash Point Method: Pensky - Martens CC
Autoignition Temperature: 433.4°F (223 °C)
LEL: 1.0% v/v
UEL: 12.8% v/v

Section 10 - Stability and Reactivity

Stability: Stable.
Possibility of Hazardous Reactions: Will not occur.
Chemical Incompatibilities: Strong oxidizing agents, acids, bases.
Conditions to Avoid: Heat, sparks, and flames; ignition sources.
Hazardous Decomposition Products: Toxic gases or vapors such as carbon monoxide, carbon dioxide, or oxides of nitrogen may be released in a fire.

Section 11- Toxicological Information

Toxicity Data:

Eye Effects: Irritation at or above PEL of 100 ppm.

Skin Effects: Irritation at or above PEL of 100 ppm.

Acute Inhalation Effects: Product toxicity has not been determined.
The following is component data:
Toluene – Rat, Inhalation, LCLo: 4000ppm/4 hrs
Heptane – Human, inhalation, TCLo: 1000 ppm/6 minutes
Acetone – Rat, inhalation, TC 50 > 20,700 ppm/8 hours
Acute Oral Effects: Product toxicity has not been determined.
The following is component data:
Toluene - Rat, oral, LD_{50}:5000mg/kg
Acetone – Rat, 5800 mg/kg; Mouse, 3000 mg/kg; Rabbit, 5340 mg/kg
Heptane - Rat, ivn, LD_{50}: 222mg/kg

Carcinogenicity: Not listed in IARC or NTP.
Mutagenicity: Some evidence in animal exposure to Toluene.
Teratogenicity: Some evidence in animal exposure to Toluene.

Section 12 - Ecological Information

This product has not been tested. No data available.

Section 13 - Disposal Considerations

Disposal: Dispose of in accordance with all local, state, and federal regulations.

Section 14 - Transport Information

DOT Transportation Data (49 CFR 172.101):

Shipping Name: Adhesives
Shipping Symbols: Flammable
Hazard Class: 3
ID No.: UN1133
Packing Group: II
Label: Red flammable liquid label required
Special Provisions (172.102): 149, B52, IB2, T4, TP1, TP8

Packaging Authorizations
a) **Exceptions:** 173.150
b) **Non-bulk Packaging:** 173.173
c) **Bulk Packaging:** 173.242

Quantity Limitations
a) **Passenger, Aircraft, or Railcar:** 5 L
b) **Cargo Aircraft Only:** 60 L

Vessel Stowage Requirements
a) **Vessel Stowage:** B
b) **Other:** N/A

Section 15 - Regulatory Information

EPA Regulations:
RCRA Hazardous Waste Number (40 CFR 261.33): Toluene U220
RCRA Hazardous Waste Classification (40 CFR 261.31): Not Classified
TSCA (Toxic Substances Control Act) Status:
TSCA (United States) – The intentional ingredients of this product are listed.
CERCLA Hazardous Substance (40 CFR 302.4) listed/unlisted specific per RCRA, Sec. 3001; CWA, Sec. 311 (b)(4); CWA, Sec. 307(a), CAA, Sec. 112
CERCLA Reportable Quantity (RQ): Toluene 1,000 lb (454.5 kg); Acetone, 5000 lb. (2272.5 kg); Xylenes (O-, M-,P-Isomers) 100 lb/45.4 kg)
SARA 311/312 Codes:
SARA Toxic Chemical (40 CFR 372.65): Toluene, CAS#108-88-3, 30-60%
SARA EHS (Extremely Hazardous Substance) (40 CFR 355): Not listed

OSHA Regulations:
Air Contaminant (29 CFR 1910.1000, Table Z-1, Z-1-A): Not listed
Clean Air Act Data: Toluene HAP Code: XOV
Clean Water Act: Toluene is listed as a priority pollutant. RQ: 1,000 lbs. (454.5 kg)

State Regulations:
California Proposition 65: This product contains the following chemical(s) known to the state of California to cause birth defects or other reproductive harm: Toluene.

Delaware Air Quality Management List:	Acetone	DRQ: 5,000 State: Must be reported to the DRQ.
	Toluene	DRQ: 1,000 State: Must be reported to the DRQ.
	Xylene	DRQ: 100 State: N

Massachusetts Hazardous Substance Codes:	Toluene	108-88-3	2,4,5,6,F7,F8
	Heptane	64742-89-8	2,4,5,6
	Acetone	67-64-1	2, 4, 5, 6, F8, F9
	Xylene	1330-20-7	2, 4, F8, F9

Michigan Critical Materials Register:	Toluene	108-88-3 Report: -- Class: --
	Xylene	1330-20-7 Report: -- Class:--

Minnesota Hazardous Substance:	Toluene	Codes: ANO Hazards: skin Carcinogen: No
	Heptane	Codes: ANO Hazards: -- Carcinogens: No
	Acetone	Codes: AON Hazards: -- Carcinogens: No
	Xylene	Codes: ANO Hazards:-- Carcinogens: No

New Jersey RTK Hazardous Substance:	Toluene	Dot#: 1294 Substance#: 1866 TPQ: -- EHS: No
	Xylenes:	Dot# 1307 Substance#: 2014 TPQ: -- EHS: No

New York List of Hazardous Substances:	Toluene	RQ Air: 1,000 RQ Land: 1 Acutely Hazardous: No
	Xylene	RQ Air: 1,000 RQ Land: 1 Acutely Hazardous: No
	Acetone	RQ Air: 5,000 RQ Land: 1 Acutely Hazardous: No

Pennsylvania Hazardous Substance Code:	Methyl Benzene (Toluene)	108-88-3 Code: E
	Heptane	64742-89-8 Code: --

Benzene, Dimethyl (Xylene)	1330-20-7	Code: E
2 Propanone (Acetone)	67-64-1	Code: E

Washington Air Contaminant:

TWA (ppm):	100 (Toluene)	750 (Acetone)
TWA (mg):	375 (Toluene)	1800 (Acetone)
STEL (ppm):	150 (Toluene)	1000 (Acetone)
STEL (mg):	560 (Toluene)	2400 (Acetone)
Ceiling (ppm):	None listed	
Ceiling (mg):	None listed	
Skin:	None listed	

Canadian WHMIS Classification: Class: B
Division 2

Section 16 - Other Information

Prepared By: Research & Development
Revision Notes: Revised CAS# for Heptane.

Disclaimer: The information contained in this document is based upon data that was supplied to Carlisle by other companies and organizations. No warranty of merchantability or fitness for a particular purpose is expressed or implied regarding the accuracy or completeness of the data and/or information in this material safety data sheet.

For the most current version of this MSDS log onto http://www.carlisle-syntec.com and go to Products and Specs/MSDS.

Material Safety Data Sheet

Product Name: Sure-Seal HP 250 Primer **MSDS No. 302070**

Date of Preparation: 6/10/11 Revision: 013

Section 1 - Chemical Product and Company Identification

Product/Chemical Name: Sure-Seal HP-250 Primer
Chemical Formula: Mixture
General Use: Primer for EPDM Membrane
Manufacturer: Carlisle SynTec 1285 Ritner Highway, Carlisle, PA 17013, Phone – 800-479-6832,
24-Hour Emergency Phone Number: CHEMTREC (USA): 800-424-9300

Section 2 - Hazards Identification

☆☆☆☆☆ Emergency Overview ☆☆☆☆☆

Danger – Highly flammable liquid and vapor
Warning – Causes skin irritation
Warning – Causes eye irritation
Warning – May be harmful if swallowed and enters airways
Danger – May damage fertility or the unborn child
Warning – May cause an allergic skin reaction
Warning – Suspected of causing genetic defects (skin)
Warning – May cause drowsiness and dizziness
Warning – May cause damage to organs (liver, kidney, ear) through prolonged or repeated exposure

HMIS	
H	1
F	4
R	0
PPE†	
†Sec. 8	

Potential Health Effects

Primary Entry Routes: Eye contact, ingestion, inhalation, skin absorption, skin contact.
Target Organs: Kidney and liver.
Acute Effects
Inhalation: May cause nose and/or throat irritation on short-term exposure to vapor. Aspiration into lungs can cause chemical pneumonitis, which can be fatal. Overexposure may result in headache, dizziness, fatigue, nausea and loss of consciousness.
Eye: May cause eye irritation on short-term exposure to liquid or vapor.
Skin: May cause skin irritation on short-term exposure to liquid or vapor. Solvents may be absorbed through the skin in toxic amounts.
Ingestion: May cause irritation of gastrointestinal tract.
Carcinogenicity: *IARC, NTP, and OSHA do not list this product as a carcinogen.*
Medical Conditions Aggravated by Long-Term Exposure: May cause more significant skin irritation in people with pre-existing skin conditions. Respiratory symptoms associated with pre-existing lung disorders and pre-existing heart disorders may be aggravated by exposure to this material.
Chronic Effects: Chronic exposure may cause reversible kidney and liver injury. Reports have associated repeated and prolonged occupational overexposure to solvents with permanent brain and nervous system damage. Repeated exposure to Toluene has been associated with high frequency hearing loss based on animal tests.

Section 3 – Ingredient Information

Hazardous Ingredients	CAS Number	% wt
Toluene	108-88-3	60-100
Heptane	64742-89-8	3-7
Hydrocarbon Tackifying Resin	68478-07-9	1-5
Additional Ingredients	**CAS Number**	**% wt**

Section 4 - First Aid Measures

Inhalation: Remove victim to fresh air and provide oxygen if breathing is difficult. Give artificial respiration if not breathing. Get medical attention immediately.

Eye Contact: Immediately flush eyes with running water for at least 15 minutes. Get medical attention.
Skin Contact: Immediately flush skin with running water and remove contaminated clothing. Wash exposed area with soap and water. Get medical attention.
Ingestion: *DO NOT induce vomiting. Get medical attention immediately.*
Note to Physicians: This material contains Toluene and Heptane.
Special Precautions/Procedures: Whenever possible, remove the worker from the source of contamination.

Section 5 - Fire-Fighting Measures

Flash Point: 4.40°C (40°F)
Flash Point Method: C.C
Autoignition Temperature: 536°C (997°F)
LEL: 1.3% v/v
UEL: 7.0% v/v

Flammability Classification: Ignition can occur when this product is exposed to heat, Division 2 sparks, or flame.
Extinguishing Media: In case of fire, use dry chemical, carbon dioxide, or foam. Water may not be effective as an extinguishing agent. Water fog or spray may be used to provide a smothering effect on fire and to cool fire-exposed containers and surrounding combustibles. Do not use a solid stream of water because it can scatter and spread the fire.
Unusual Fire or Explosion Hazards: Extremely flammable. Store and use away from all sources of heat, flame, or sparks. Do not smoke while applying. Vapors are heavier than air and may travel along ground or may be moved by ventilation and ignited by pilot lights, other flames, sparks, heaters, smoking, electrical motors, static discharge, or other ignition sources at locations distant from material handling point and flash back. All containers should be grounded when material is transferred.
Hazardous Combustion Products: Toxic gases or vapors, such as carbon monoxide or carbon dioxide, may be released in a fire.
Fire-Fighting Instructions: This product contains solvents that are dangerous fire and explosion hazards when exposed to heat or flame.
Fire-Fighting Equipment: Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) and full protective clothing along with a full face piece operated in pressure-demand or positive-pressure mode.

Section 6 - Accidental Release Measures

Personal Precautions: Use personal protection recommended in Section 8.
Spill /Leak Procedures: Remove all sources of ignition. Avoid breathing vapors. Use self-contained breathing apparatus in enclosed area. Ventilate area. Contain and remove with inert absorbent materials and non-sparking tools. For large spills, dike far ahead of liquid spill for later disposal. Do not release into sewers or waterways.
Regulatory Requirements: Follow applicable OSHA regulations (29 CFR 1910.120).

Section 7 - Handling and Storage

Handling Precautions: Use away from all sources of heat, flame, or sparks. Do not smoke while using. Handling equipment must be grounded to prevent sparking. Handle with non-sparking tools. Wash with soap and water before eating or drinking. Launder contaminated clothing. KEEP OUT OF REACH OF CHILDREN.
Storage Requirements: Keep containers cool, dry, and store away from all sources of heat, flame, and sparks. Keep containers tightly closed and store with adequate ventilation. Do not pressurize, cut, weld, or grind the containers or empty containers, which may contain residual product and solvent vapors that may ignite explosively.

Section 8 - Exposure Controls / Personal Protection

Hazardous Ingredients:

	OSHA PEL		ACGIH TLV		NIOSH REL		NIOSH
Ingredient	TWA	STEL	TWA	STEL	TWA	STEL	IDLH
Toluene	200 ppm	150 ppm	20 ppm	None estab.	100 ppm	150 ppm	500 ppm
Heptane	500 ppm	500 ppm	400 ppm	500 ppm	85 ppm	440 ppm	750 ppm

Engineering Controls: Do not use in enclosed areas without proper explosion-proof ventilation. General and local exhaust ventilation must be sufficient to control vapor concentrations and keep the vapor concentration below 100 ppm.
Ventilation: Provide general or local exhaust ventilation systems to maintain airborne concentrations below OSHA PELs. Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.
Respiratory Protection: A NIOSH approved respirator must be used if vapor concentration is 100 ppm or above.

Protective Clothing/Equipment: Permeation resistant gloves (that meet ANSI/ISEA 105-2005) required. Protective glasses or goggles recommended. Industrial boots to protect feet from cleaner contact. Impervious clothing is recommended to protect skin from cleaner contact. Protective skin creams or emollients useful.

Safety Stations: Make emergency eyewash stations, safety/quick-drench showers, and washing facilities available in work area.

Contaminated Equipment: Separate contaminated work clothes from street clothes. Launder before reuse. Remove this material from your shoes and clean personal protective equipment.

Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance and Odor: Thin olive green to dark grey liquid with hydrocarbon odor
Odor Threshold(ppm): Not available
Vapor Pressure: 36.7 mm Hg at 30°C (86°F)
Vapor Density (Air=1): 3.14
Specific Gravity (H_2O=1, at 4°C): 0.88
pH: Not available

Water Solubility: Negligible
Boiling Point(°C): 110.4°C (230.7°F)
Freezing/Melting Point -95.0°C (-139°F)
% Volatile by Weight: 80-90
Evaporation Rate: (nBuAc=1): 2.1
Voc: 727 g/l
Flash Point: 4.40°C (40°F)
Flash Point Method: C.C
Autoignition Temperature: 536°C (997°F)
LEL: 1.3% v/v
UEL: 7.0% v/v

Section 10 - Stability and Reactivity

Stability: Stable under normal conditions.
Possibility of Hazardous Reactions: Will not occur.
Chemical Incompatibilities: Strong oxidizing agents, acids, bases, amines.
Conditions to Avoid: Heat, sparks, and flames; ignition sources.
Hazardous Decomposition Products: Toxic gases or vapors such as carbon monoxide or carbon dioxide, may be released in a fire.

Section 11- Toxicological Information

Toxicity Data:

This product has not been tested. No data available.

Section 12 - Ecological Information

Ecotoxicity: No data available.
Environmental Fate: No data available.
Environmental Degradation: No data available.
Soil Absorption/Mobility: No data available.

Section 13 - Disposal Considerations

Waste Disposal: Dispose of in accordance with all local, state, and federal regulations.

Section 14 - Transport Information

DOT Transportation Data (49 CFR 172.101):

Shipping Name: Adhesives, 3
Shipping Symbols: Flammable
Hazard Class: 3
ID No.: UN 1133
Packing Group: II
Label: Red caution label required.
Special Provisions (172.102): 149, B52, IB2, T4, TP1, TP8

Packaging Authorizations
a) Exceptions: 173.150
b) Non-bulk Packaging: 173.173
c) Bulk Packaging: 173.242

Quantity Limitations
a) Passenger, Aircraft, or Railcar: 5 L
b) Cargo Aircraft Only: 60 L

Vessel Stowage Requirements
a) Vessel Stowage: B
b) Other: --

Section 15 - Regulatory Information

EPA Regulations:

RCRA Hazardous Waste Number (40 CFR 261.33): Toluene, CAS #108-88-3, RCRA Code U220

RCRA Hazardous Waste Classification (40 CFR 261.31): Not classified

TSCA (Toxic Substances Control Act) Status: TSCA (United States) The intentional ingredients of this product are listed.

CERCLA Hazardous Substance (40 CFR 302.4): Toluene, CAS #108-88-3, RQ 1000 lb

CERCLA Reportable Quantity (RQ): Materials with a "listed" RQ may be reportable as an "unlisted hazardous substance". See 40 CFR 302.5 (b).

SARA 313 Components (40 CFR 372.65): Toluene, CAS #108-88-3, 60-100%

SARA Toxic Release Chemicals: Toluene, CAS #108-88-3, Concentration: 1.0%, Reporting Threshold: Standard

OSHA Regulations:

Clean Water Act Hazardous Substances: Toluene, CAS #108-88-3, RQ 1000 lb

Clean Air Act SOCMI Chemicals: Toluene, CAS #108-88-3

Clean Air Act Hazardous Air Pollutants: Toluene, CAS #108-88-3, HAP Code XOV

OSHA, IARC, NTP Carcinogens: None listed.

State Regulations:

California Proposition 65 Chemicals: Toluene, CAS #108-88-3, Code D

Delaware Air Quality Management List: Toluene, CAS #108-88-3, DRQ: 1000, State: Y

Massachusetts Hazardous Substances List:
Heptane, CAS# 64742-89-8, Codes: 2, 4, 5, 6
Toluene, CAS #108-88-3, Codes: 2, 4, 5, 6, F7, F8, F9

Michigan Critical Materials Register:
Toluene, CAS #108-88-3, Report Code: --, Class: --

Minnesota Hazardous Substances List:
Heptane, CAS# 64742-89-8, Codes: ANO, Hazards: -, Carcinogen: No
Toluene, CAS #108-88-3, Codes: ANO, Hazards: Skin, Carcinogen: No

New Jersey RTK Hazardous Substance List:
Toluene, CAS #108-88-3, Substance #: 1866, DOT #: 1294

New York List of Hazardous Substances:
Toluene, CAS #108-88-3, RQ-Air: 1000, RQ-Land: 1, Notes: None

Pennsylvania Hazardous Substances List:
Heptane, CAS# 64742-89-8, Code: - (Basic Hazard)
Toluene, CAS #108-88-3, Code: E (Environmental Hazard)

Washington Permissible Exposure Limits for Air Contaminants:

Chemical Name	CAS #	TWA (ppm)	TWA (mg)	STEL (ppm)	STEL (mg)	Ceiling (ppm)	Ceiling (mg)	Skin
Heptane	64742-89-8	400	1600	500	2000	--	--	--
Toluene	108-88-3	100	375	150	560	--	--	--

Section 16 - Other Information

Prepared By: Research & Development
Revision Notes: Section 15- Added TSCA statement

Additional Hazard Rating Systems:

Disclaimer: The information contained in this document is based upon data that was supplied to Carlisle by other companies and organizations. No warranty of merchantability or fitness for a particular purpose is expressed or implied regarding the accuracy or completeness of the data and/or information in this material safety data sheet.

Material Safety Data Sheet

SURE-WELD NON-REINFORCED (TPO) FLASHING **MSDS No. 300473**

Date of Preparation: 06/08/2005 Revision: 002

Section 1 - Chemical Product and Company Identification

Product/Chemical Name: Sure-Weld Non-Reinforced (TPO) Flashing
Chemical Formula: Mixture
General Use: Roof and Waterproofing Flashing
Manufacturer: Carlisle SynTec Incorporated, 1285 Ritner Highway, Carlisle, PA 17013, Phone: 800-479-6832
Emergency Phone Number: CHEMTREC (USA) 800-424-9300

Section 2 - Composition / Information on Ingredients

Ingredient Name	CAS Number	% wt *or* % vol
Propylene ethylene copolymer	9010-79-1	>70
Stabilizers (trade secret)		>5

Hazardous Ingredients:

Ingredient	OSHA PEL TWA	OSHA PEL STEL	ACGIH TLV TWA	ACGIH TLV STEL	NIOSH REL TWA	NIOSH REL STEL	NIOSH IDLH

This product is considered to be a finished article as defined by 29 CFR 1910.1200 and is exempt from the requirements of the Hazard Communication standard. This product is nonhazardous as per 29 CFR 1910.1200.

Section 3 - Hazards Identification

☆☆☆☆☆ **Emergency Overview** ☆☆☆☆☆

HMIS
H 0
F 1
P 0
PPE†
†Sec. 8

Potential Health Effects

Primary Entry Routes: None
Target Organs: Not Applicable
Acute Effects
Inhalation: Inhalation of vapor from this product during heat welding may cause respiratory tract irritation.
Eye: Vapor from this product during heat welding may irritate eyes.
Skin: Exposure to hot surfaces during heat welding may cause thermal burns.
Ingestion: Ingestion difficult, no known health effects.
Carcinogenicity: None Known
Medical Conditions Aggravated by Long-Term Exposure: None Known
Chronic Effects: None Known

Section 4 - First Aid Measures

Inhalation: If breathing becomes difficult, remove person from heat welding area and get medical attention.
Eye Contact: If eye irritation continues after welding, flush eyes with water for 15 minutes
Skin Contact: If skin is burned from welding operation, cool with running water. Get medical attention if necessary.
Ingestion: Not Applicable
After first aid, get appropriate in-plant, paramedic, or community medical support.
Note to Physicians: None
Special Precautions/Procedures: None

Section 5 - Fire-Fighting Measures

Flash Point: Above 329 °C
Flash Point Method: Setchkin
Burning Rate: Not Determined
Autoignition Temperature: >357 °C
LEL: Not Applicable
UEL: Not Applicable
Flammability Classification: Not flammable.
Extinguishing Media: Water spray, dry chemical, foam, or carbon dioxide.

NFPA

Unusual Fire or Explosion Hazards: None
Hazardous Combustion Products: Toxic gases or vapors, such as carbon monoxide and other organic compounds may be released in a fire.
Fire-Fighting Instructions: Standard procedures for Class A fires. Use self-contained breathing apparatus (SCBA) and protective clothing for structural fire fighting.
Fire-Fighting Equipment: Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full face piece operated in pressure-demand or positive-pressure mode.

Section 6 - Accidental Release Measures

Spill /Leak Procedures: Handle as normal solid waste.
Regulatory Requirements: Follow applicable OSHA regulations (29 CFR 1910.1200).

Section 7 - Handling and Storage

Handling Precautions: Keep away from sparks and open flame.
Storage Requirements: This product may react with strong oxidizing agents and should not be stored near such materials. Best to store rolls in areas protected by automatic sprinklers. Store product below 60°C (140°F) to prevent roll sticking at installation
Regulatory Requirements: Not Applicable

Section 8 - Exposure Controls / Personal Protection

Engineering Controls: Provide adequate ventilation during heat welding.
Ventilation: Heat welding in an outdoor environment will normally provide adequate ventilation.
Administrative Controls: Assure that adequate ventilation is provided during heat welding.
Respiratory Protection: A respiratory protection program that meets OSHA 1910.134, ANSI Z88.2 and / or CSA Z94.4-93 requirements must be followed whenever workplace conditions warrant use of a respirator.
Protective Clothing/Equipment: Work boots and work clothing recommended. Sunglasses which filter out ultraviolet light are strongly recommended since the white surface is highly reflective to sunlight. White surfaces reflect heat and light. Roofing technicians should dress appropriately and wear sunscreen to protect skin from the sun.
Safety Stations: Emergency eyewash stations or source of clean running water recommended in vicinity of project
Contaminated Equipment: Not Applicable
Comments: Never eat, drink, or smoke in work areas. Best to wash hands after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9 - Physical and Chemical Properties

Physical State: Solid
Appearance and Odor: White-on-black sheet; slight waxy odor. (white may be replaced by tan, gray, etc)
Odor Threshold(ppm): Not Determined
Vapor Pressure: Not Applicable
Vapor Density (Air=1): Not Applicable
Formula Weight: Not Applicable
Density:
Specific Gravity (H_2O=1, at 4 °C): 0.95-1.05
pH: Not Applicable

Water Solubility: Practically insoluble in water
Other Solubilities: Not Determined
Boiling Point(°C): Not Applicable
Freezing/Melting Point(°C): >120
Viscosity: Not Applicable
Refractive Index: Not Applicable
Surface Tension: Not Applicable
% Volatile: Not Determined
Evaporation Rate: Not Applicable

Section 10 - Stability and Reactivity

Stability: Stable.
Polymerization: Will not occur.
Chemical Incompatibilities: Any strong oxidizing agent.
Conditions to Avoid: Keep away from heat, sparks or open flame
Hazardous Decomposition Products: Gases or vapors such as carbon monoxide, carbon dioxide, or oxides of nitrogen, and other organic compounds may be released in a fire.

Section 11- Toxicological Information

Toxicity Data:

Eye Effects: None Known
Skin Effects: None Known

Acute Inhalation Effects: None Known
Acute Oral Effects: None Known
Chronic Effects: None Known
Carcinogenicity: No evidence
Mutagenicity: No evidence.
Teratogenicity: No evidence.

Section 12 - Ecological Information

Ecotoxicity: None Known
Environmental Fate: This product is not readily biodegradable
Environmental Degradation: Not Determined
Soil Absorption/Mobility: Not Determined

Section 13 - Disposal Considerations

Disposal: (1) Recycle / reprocess; (2) Incineration including energy recovery of waste material in a permitted facility in accordance with local, state or federal regulations; (3) Landfilling in a licensed facility in accordance with local, state or federal regulations
Disposal Regulatory Requirements: This product is not judged to be a hazardous waste by any local, state or federal regulation. This product is not listed in the U.S. federal hazardous waste regulations, 40 CFR261.33 paragraphs (e) or (f)
Container Cleaning and Disposal: Not Applicable

Section 14 - Transport Information

DOT Transportation Data (49 CFR 172.101):

This product is not regulated by DOT, IMO, IATA, Canadian TDG and associated regulations ADR or RID.

Section 15 - Regulatory Information

EPA Regulations:
RCRA Hazardous Waste Number: Not Listed
RCRA Hazardous Waste Classification: Not Classified
CERCLA Hazardous Substance: Not Listed
CERCLA Reportable Quantity (RQ): Not Listed
SARA 311/312 Codes: This product is not subject to SARA Title III requirements
SARA Toxic Chemical (40 CFR 372.65): Not listed
SARA EHS (Extremely Hazardous Substance) (40 CFR 355): Not Listed
OSHA Regulations:
Air Contaminant (29 CFR 1910.1000, Table Z-1, Z-1-A): Not listed
OSHA Specifically Regulated Substance: Not Listed
State Regulations: California Proposition 65: This product contains the following chemical(s) known to the state of California to cause cancer: None.

Section 16 - Other Information

Prepared By: Research & Development (BG)
Revision Notes: Revised to 16 part format

Additional Hazard Rating Systems:

Disclaimer: The information contained in this document is based upon data that was supplied to Carlisle by other companies and organizations. No warranty of merchantability or fitness for a particular purpose is expressed or implied regarding the accuracy or completeness of the data and/or information in this material safety data sheet.